

LONG ISLAND SOUND STUDY

Wastewater Treatment

What is Wastewater?

There is no question that the natural resource most critical to our everyday activities is water. We use water freely in our homes, yet give little thought to what happens to it after it goes down the drain. In fact, each of us pours or flushes an average 100 gallons of water per day down household drains. This water, plus water discharged to sewers by commercial and industrial enterprises, is called wastewater. In areas serviced by sewers, wastewater flows to a local treatment facility, or sewage treatment *plant* (STP). Currently 44 such facilities discharge over 1 billion gallons of treated effluent into Long Island Sound every day. While most of us prefer not to dwell on the subject of sewage, what happens to **waste-**water should greatly concern all of us.

Why Should We Be Concerned About Wastewater?

Although typical wastewater is over 99% water, the remaining 1% may contain substances that are potentially harmful to aquatic life and to us. Many products we use in our everyday



life (bathroom cleaner, for instance) introduce toxic contaminants to the wastewater. Also, more "natural" substances such as bacteria and *nu-*
trients enter wastewater from human wastes. Improperly treated wastes pose risks both to the health of Long Island Sound and to the people who enjoy its resources. Contaminants can threaten the health of the Sound's fish and shellfish, affect the health of people who swim in its waters, and pose a threat to people who eat seafood. Excess nutrients pose a special threat to Long Island Sound by stimulating algal blooms that deplete dissolved oxygen after they die and decay (see Fact Sheet #1). For these reasons, the quality of the Sound's water is closely tied to the location, volume, and treatment level of the effluent being discharged by STPs.

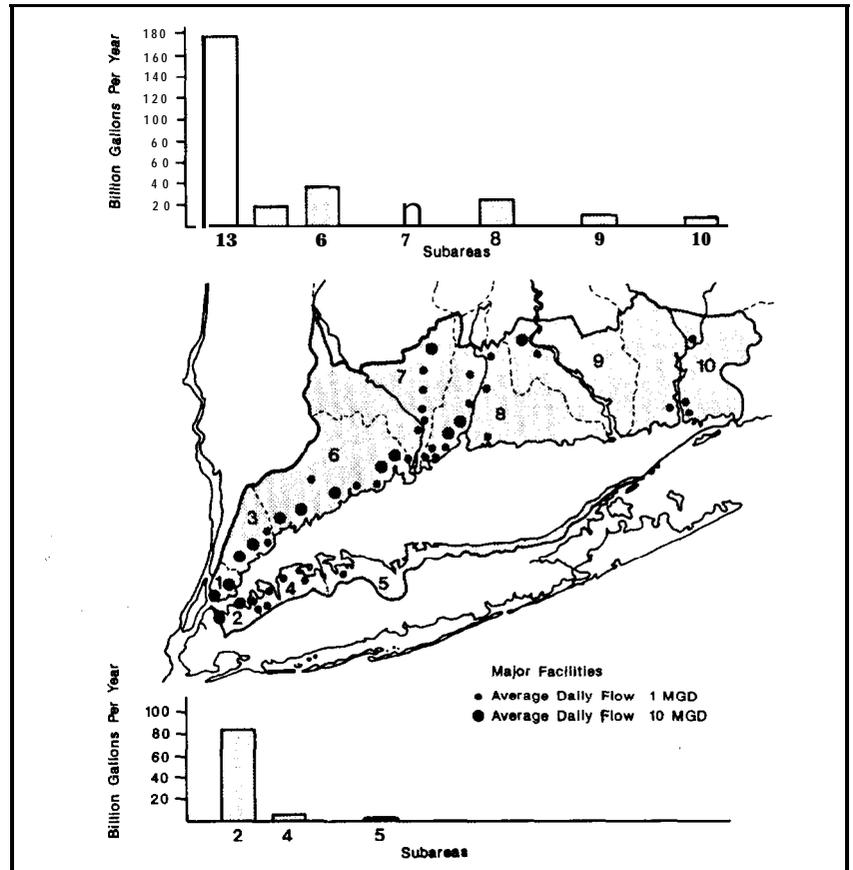
How Is Wastewater Treated?

Before our coastal areas became so heavily populated, much of the wastewater we produced was piped directly to our rivers, streams, and bays without undergoing treatment. Nature provided the necessary purification. As population density increased, the aquatic systems could no longer absorb the large volumes of wastewater without environmental damage and human health risk. People found that wastewater needed to be treated before its release into the environment. The three levels of sewage treatment (*primary, secondary, and advanced or tertiary*) vary in their ability to remove harmful components such as organic matter, nutrients, and toxins.

Primary Treatment

Primary treatment involves a process which removes heavy solids by mimicking the natural downward settling of particles that occurs in a pond. The wastewater flows through a screen that removes large debris, and then passes through a grit chamber to remove grit, sand, and gravel. Next, wastewater travels through a settling tank where, as in a pond, the slow flow allows fine materials to settle out. The effluent may be disinfected (usually with chlorine) to kill *pathogens* - disease causing organisms - and discharged.

Primary treatment is inadequate for the Sound because oxygen-absorbing



ANNUAL WASTEWATER TREATMENT PLANT DISCHARGES

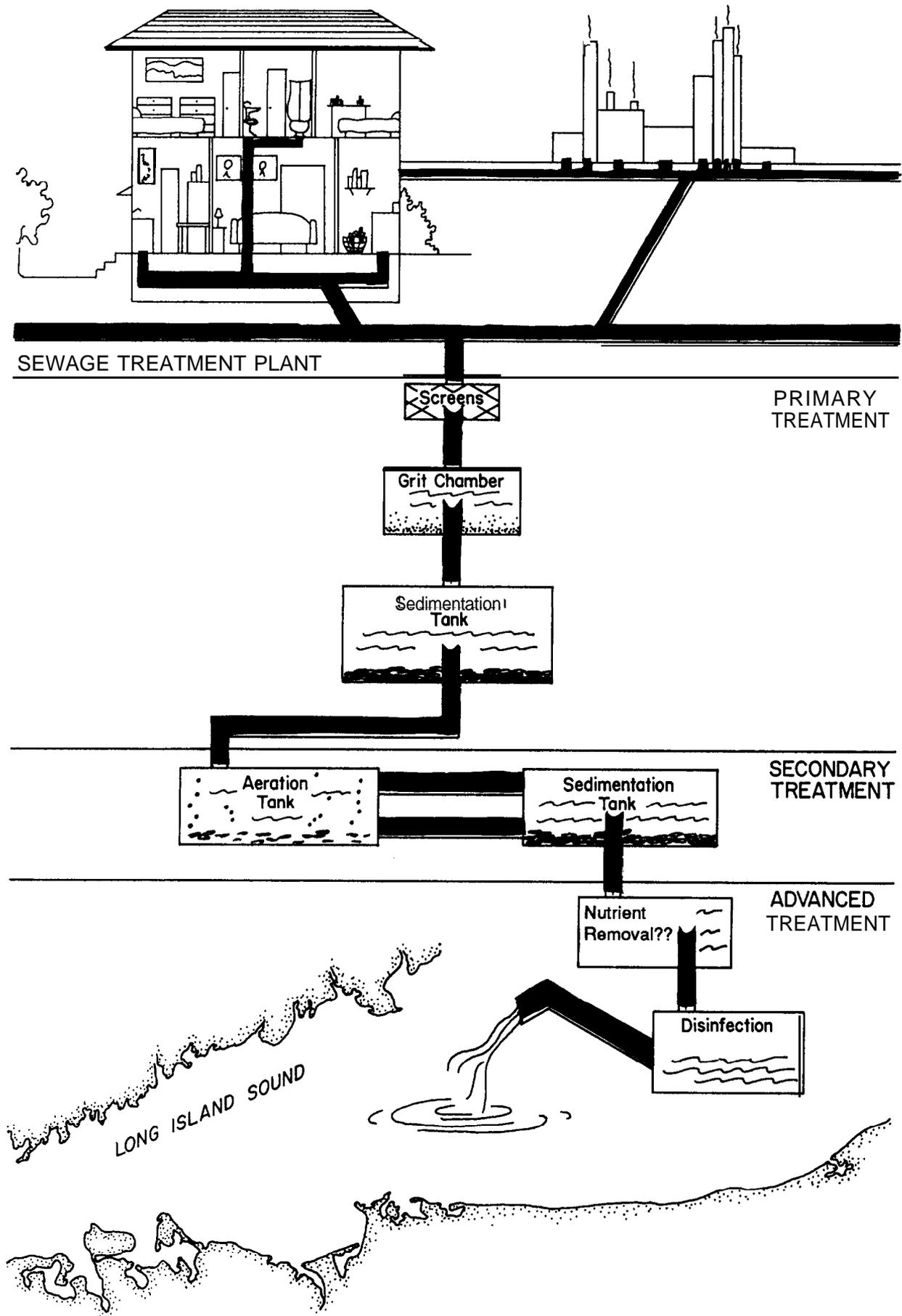
(From National Oceanic and Atmospheric Administration)

organic matter in the wastewater is not removed. If the organic content of the discharged effluent is high enough, its natural breakdown by bacteria after can severely deplete the oxygen in the water.

Secondary Treatment

Secondary treatment involves moving the location of the natural bacterial breakdown of **organics** from the waters of the Sound to the vats of the treatment plant. The secondary treatment process can be compared to the natural purifying action of a stream, where the turbulent mixing of the water accelerates the breakdown of organic matter. In the treatment plant, these natural processes are simulated and enhanced by oxygenating the wastewater.

The Journey of Wastewater to Long Island Sound



Secondary treatment can remove up to 90% of the organic material in sewage. This is important because the decomposition of organic matter depletes the water of dissolved oxygen. It is crucial to reduce this oxygen demand in the effluent, because the health of any body of water depends on its ability to maintain a certain amount of dissolved oxygen.

Advanced or Tertiary Treatment

In some cases, secondary treatment is not enough to protect the environment. Secondary treatment breaks down most of the organic material, but it does not remove nutrients produced in the process or any toxic materials added to the wastewater stream entering the STP. Thus, the plant's effluent may still cause oxygen depletion or contain substances that can alter the environmental balance of the receiving water. If this balance is upset, a more advanced level of treatment, sometimes called tertiary, may be needed to remove the causative agents. The type of advanced treatment needed depends on the specific material(s) to be removed.

The Long Island Sound Study, Wastes, and You

The Long Island Sound Study (LISS) is currently assessing the impact of sewage treatment plant discharges on Long Island Sound. A computer model is being developed that will link these discharges to the water quality, helping LISS managers to devise a strategy to protect the Sound (see Fact Sheet #2). It may be that advanced treatment will be needed at some plants. Dealing with the effects of STP effluent will be a major part of the Study's management plan for the Sound.

Means of improving the health of the Sound can and must be implemented by everyone living around it. Simple tasks practiced in the home (such as judicious use of lawn fertilizer) can reduce input of contaminants and nutrients into the Sound. (Contact the NY and CT Sea Grant Programs for more information). Without a coordinated effort to reduce the input of wastes to the Sound, it will continue to suffer from environmental degradation that, if continued for an extended period, may become irreversible.

The Long Island Sound Study

The Long Island Sound Study (LISS) is a six-year research and management project that began in 1985 as part of the National Estuary Program, a recent addition to the federal Clean Water Act created to protect estuaries of national importance. The LISS is a cooperative effort involving research institutions, regulatory agencies, marine user groups, and other concerned organizations and individuals. The purpose of the Study is to produce a management plan for the Sound that will be administered by the three major LISS partners, the Environmental Protection Agency and the states of Connecticut and New York. To get involved with the Study, or for more information, contact: the New York Sea Grant Extension Program, Dutchess Hall, SUNY, Stony Brook, NY. 11794, Tel. (516) 632-8737; or the Connecticut Sea Grant Marine Advisory Program, 43 Marne Street, Hamden, CT 06514, Tel. (203) 789-7865.



This fact sheet was produced by the New York Sea Grant Extension Program and the Connecticut Sea Grant Marine Advisory Program. Written by Melissa Beristain.



Funding provided by the Long Island Sound Study. Cooperating agencies:



CT DEP



EPA NEP



NYS DEC